

Xenillidae, A New Family of Oribatid Mites (Acari: Cryptostigmata)**

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Abstract The taxonomic placement of *Xenillus* is reviewed as a basis for the establishment and characterization of the new family, **Xenillidae**. The family is differentiated from Liacaridae primarily by the rugose or pitted integument, relatively broad, rugose lamellae with or without cusps and mucro, types and numbers of notogastral and ventral setae. The distinctive traits of the type genus and species, *X. clypeator*, and *X. latus*, *X. tegeocranus*, *X. splendens*, *X. sculptrus* are summarized and illustrated. Four new species are described and figured, *X. gelasinus* from Utah, *X. anasillus* from Lebanon, *X. phryxothrixus* from North Carolina, and *X. ionthadosus* from Georgia, Louisiana, Utah, and North Carolina. **Stenoxenillus atraktus**, n. gen., n. sp., from North Carolina is described and illustrated. Three new species of the new genus **Stonyxenillus** are described, **S. spilotus** from North Carolina, **S. anakolosus** from North Carolina, Tennessee, and Alabama, and **S. akidosus** from Virginia. Another new genus and species, **Leuroxenillus trichionus** from Oregon, is also described. A key to the genera and species is included.

The taxonomic placement of the genus *Xenillus* Rob.-Desv., 1839, has changed over the years. Willmann (1931) included *Xenillus* in the family Carabodidae with many of the genera indicated for that family by Sellnick (1928). Baker and Wharton (1952) followed Willman's arrangement and explained the synonymy of *Xenillus* with *Cepheus* and *Banksia*. Sellnick (1928) placed the synonym *Banksia* in the family Tegeocranidae with several other carabodid genera. His placement of *X. castaneus* and *X. pectinatus* was changed to *Oribella* by Willmann (1931) since the two species were not *Xenillus*. Balogh (1961) erected the superfamily Liacaroida and included *Xenillus* in the family Liacaridae with the genera *Liacarus* Michael, 1898, and *Adoristes* Hull, 1916. Balogh's other papers (1963, 1965) followed this scheme.

After a review of the literature and a comparative study of several species of mites similar to *Xenillus*, it appears to us that the genus belongs neither in Liacaridae nor Carabodidae, although the mites are definitely liacaroid. We propose a new family for this complex of mites, the bases of which are discussed below in addition to distinctive features of existing species, and descriptions of new genera and species disclosed by this research.

XENILLIDAE, new family

This new family is characterized by an unnotched or slightly notched rostrum; broad, blade-like lamellae, with or without cusps or a mucro; surface of prodorsum and lamellae pitted, tuberculous, or rugose; translamella usually present;

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with two pairs of humeral setae at shoulders of hysterosoma; dorsal and ventral integument pitted, tuberculous or rough (as contrasted to the smooth integument of Liacaridae); sensillus clavate, spindleform, lanceolate, or setiform; usually twelve pairs of notogastral hairs; seven to nine pairs of coxisternal setae; usually six pairs (five pairs may be present) of genital setae; fissure *iad* anterior to *ada*:3 as in other Liacaroidea; two pairs of anal setae, usually inserted near medial margin of cover; legs heterotridactylous; trochanteral fossae II, III with tubercles.

From the comparisons made we have decided that the genus *Xenillus* should be restricted to those mites of this complex with a clavate sensillus (pseudostigmatic organ). We have concluded that the sensillus is of generic significance in this complex and is a more consistent feature at the generic level than other structures. New genera described below are distinguished by spindleform sensilli. Others yet to be described exhibit setiform sensilli.

As previously designated by Willmann (1931) for the genus the established species *Xenillus clypeator* Rob.-Desv., 1839, represents the new family as type. We have summarized below the main descriptive characters of the type and each of the current species from the literature. The immature stages of *X. clypeator* and *X. tegeocranus* have been described by Costeseque and Taberly (1961). Our study involved preserved adults only.

Xenillus clypeator Rob.-Desv., 1839

(= *Notaspis tegeocranus* Herm.) Willmann (1931), p. 145; Jacot (1929), p. 128
(Fig. 1)

Large, arched mites with wide, converging lamellae; with a small mucro; notogastral setae slightly decurved.

Specimens of the next two species were obtained for study from the Regensburg collections of Jacot through the assistance of Dr. H. W. Levi and the auspices of the Museum of Comparative Zoology at Harvard.

Xenillus latus (Nic., 1855), Michael 1883, p. 295

(Fig. 2)

Lamellae wide, horizontal, approaching anteriorly; lamellar hairs long, thick, curved, and rough; interlamellar hairs twice as long as lamellar hairs; clavate sensillus short, pyriform, recurved.

Xenillus tegeocranus (Herm., 1804), Michael 1883, p. 292

(Fig. 3)

Lamellae with sharp, medial dens; lamellar hairs inserted near outer angles of lamellae; interlamellar hairs rod-like; hysterosoma with pitted surface, margins of pits running together (Michael says: "coarsely reticulated on both upper and lower surfaces"); sensillus elongated, clavate.

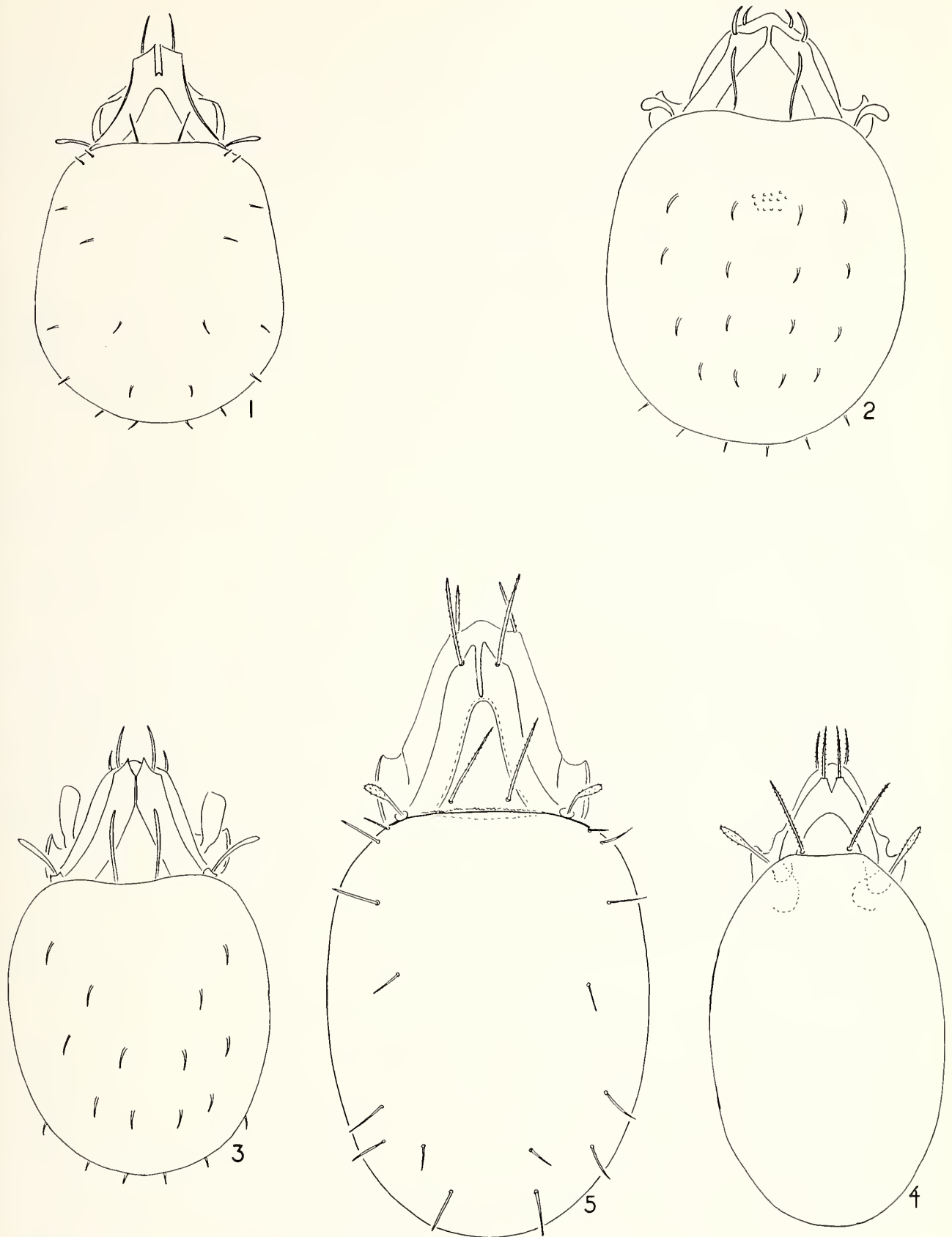


FIG. 1. *Xenillus clypeator* from the dorsal aspect (After Balogh, 1943).

FIG. 2. *Xenillus latus* from the dorsal aspect (After Michael, 1883).

FIG. 3. *Xenillus tegeocranus* from the dorsal aspect (After Michael, 1883).

FIG. 4. *Xenillus splendens* from the dorsal aspect (After Balogh, 1943).

FIG. 5. *Xenillus sculptrus* from the dorsal aspect (After Kuliev, 1963).

Xenillus splendens (Coggi, 1898), Balogh, 1943, p. 132
(Fig. 4)

Lamellae broadly curved, with truncated anterior cusp; with translamella; rostral, lamellar, and interlamellar hairs barbed; lamellar hairs inserted in ends of lamellae; interlamellar hairs as long as lamellae, setose; sensillus clavate, with tiny barbs; notogaster with pitted surface.

Xenillus sculptrus Kuliev, 1963
(Fig. 5)

Lamellae with blunt medial dens; rostral, lamellar, interlamellar hairs barbed; translamella narrow, a deep cleft between cusps of lamellae; sensillus clavate, barbed, slightly recurved; anterior humeral bristle much shorter than posterior.

Xenillus gelasinus, n. sp.
(Figs. 6, 7, 8)

DIAGNOSIS: Lamellae convergent and with two sharp dentes, lateral dens longer than medial; surface of notogaster with elongated pits; differing from other species of the genus in the lamellae and the sculpturing of the notogaster.

The specific name indicates the dimpled nature of the integument of the prodorsum, lamellae, and notogaster.

DESCRIPTION: Color dark rust-brown; prodorsum broadly triangular, rostrum rounded; rostral hairs barbed, longer than sensilli, inserted in notch at anterolateral margin of rostrum about one of their lengths apart; lamellae as wide as pedotecta I as seen from dorsal aspect, not reaching end of rostrum, of equal width throughout, surface dimpled with elongated pits, anterior end cusped, notched, with short, sharp lateral dens, smaller medial dens; lamellar hairs stout, but broken off in type specimen; translamella with a short, rounded mucro; interlamellar hairs simple, erect, nearly as long as lamellae, inserted in front of dorsosejugal suture near medial margin of lamellae; pseudostigmata mostly beneath anterior margin of hysterosoma, cup-shaped; sensillus clavate, slightly curved, with tiny barbs; pedotecta I blunt, rounded (Fig. 6).

Hysterosoma nearly round, anterior margin of dorsosejugal suture nearly straight; suture with a roughened edge; two pairs of simple setae at shoulders, ten other pairs of notogastral setae visible; fissure *im* lateral; dorsal surface dimpled with large, elongated pits, and fine granulations (Fig. 6).

Camerostome oval; mental, genal, rutellar, and ventral setae as seen in Fig. 7; genital aperture between levels of coxae III, IV, trapezoidal, about two and one-half times its length anterior to anal aperture; each genital cover with six setae, g:1, g:2, g:3, g:4 close together in anterior half of cover near medial edge, g:5, g:6 diagonally placed in posterior half of cover, g:5 more lateral than g:6; aggenital setae about twice their lengths directly posterior to genital aperture; ventral plate anterior of genital opening less sclerotized than posteriorly, dimpled with large pits between genital and anal openings (Fig. 7); anal opening squarish but with rounded corners, close to posterior margin; each anal cover with two simple setae; fissure *iad* anterolaterad of anal opening; two pairs of adanal setae visible in type specimen, ada:3 near anterolateral corner of anal opening, ada:2 laterad, between levels of a:1 and a:2; ada:1 not visible (probably due to overlapped margin of hysterosoma).

LEGS: Heterotridactylous, median claw longer, but not moderately heavier than lateral claws; setal complex of tarsus and tibia I as seen in Fig. 8.

LENGTH: 1,008 μ , hysterosoma 750 μ , prodorsum 258 μ ; width: 714 μ .

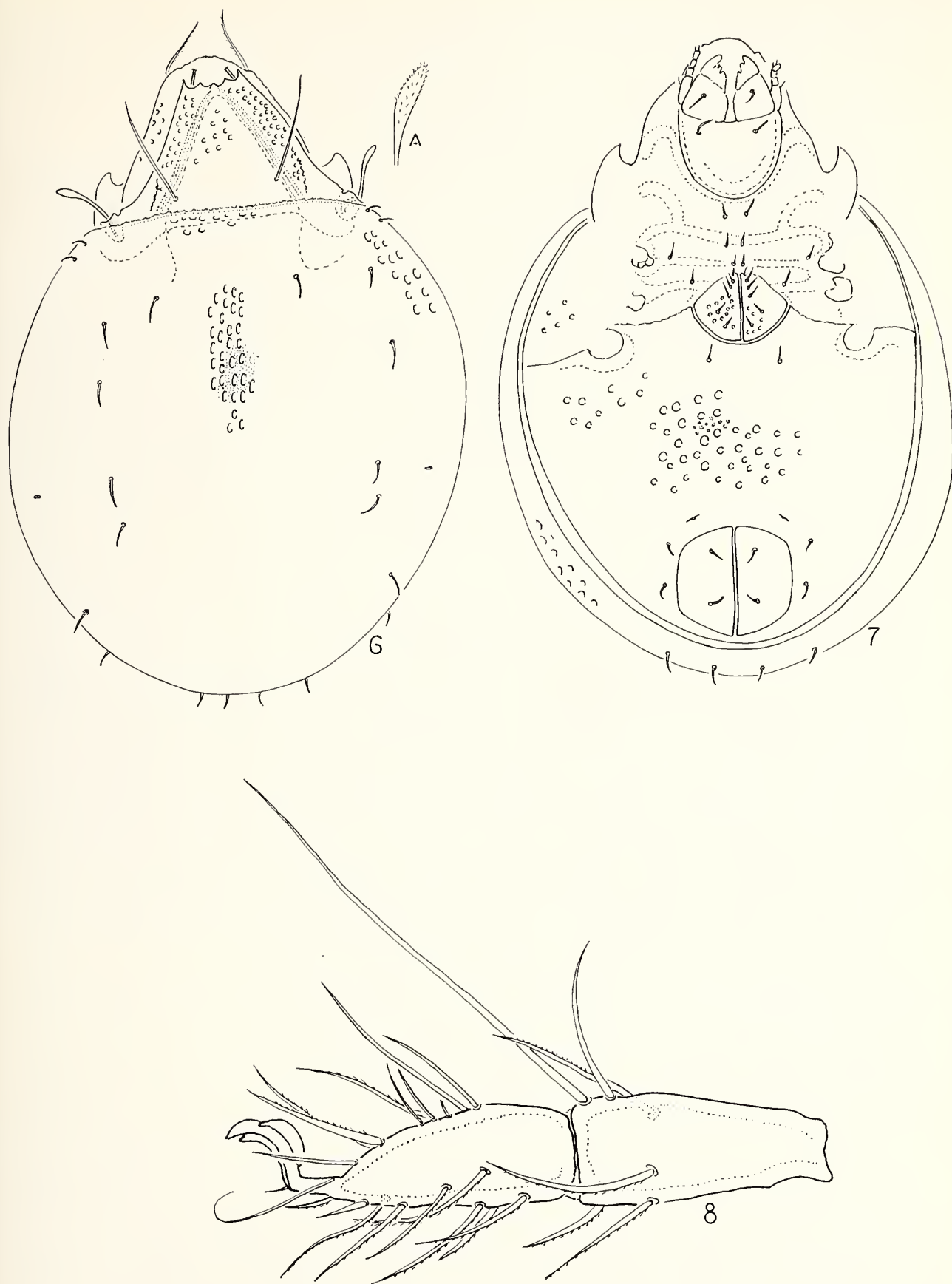


FIG. 6. *Xenillus gelasinus*, n. sp., from the dorsal aspect; A, free-hand sketch of sensillus.

FIG. 7. *Xenillus gelasinus*, n. sp., from the ventral aspect.

FIG. 8. Tibia and tarsus I of *X. gelasinus*, n. sp., from the lateral aspect.

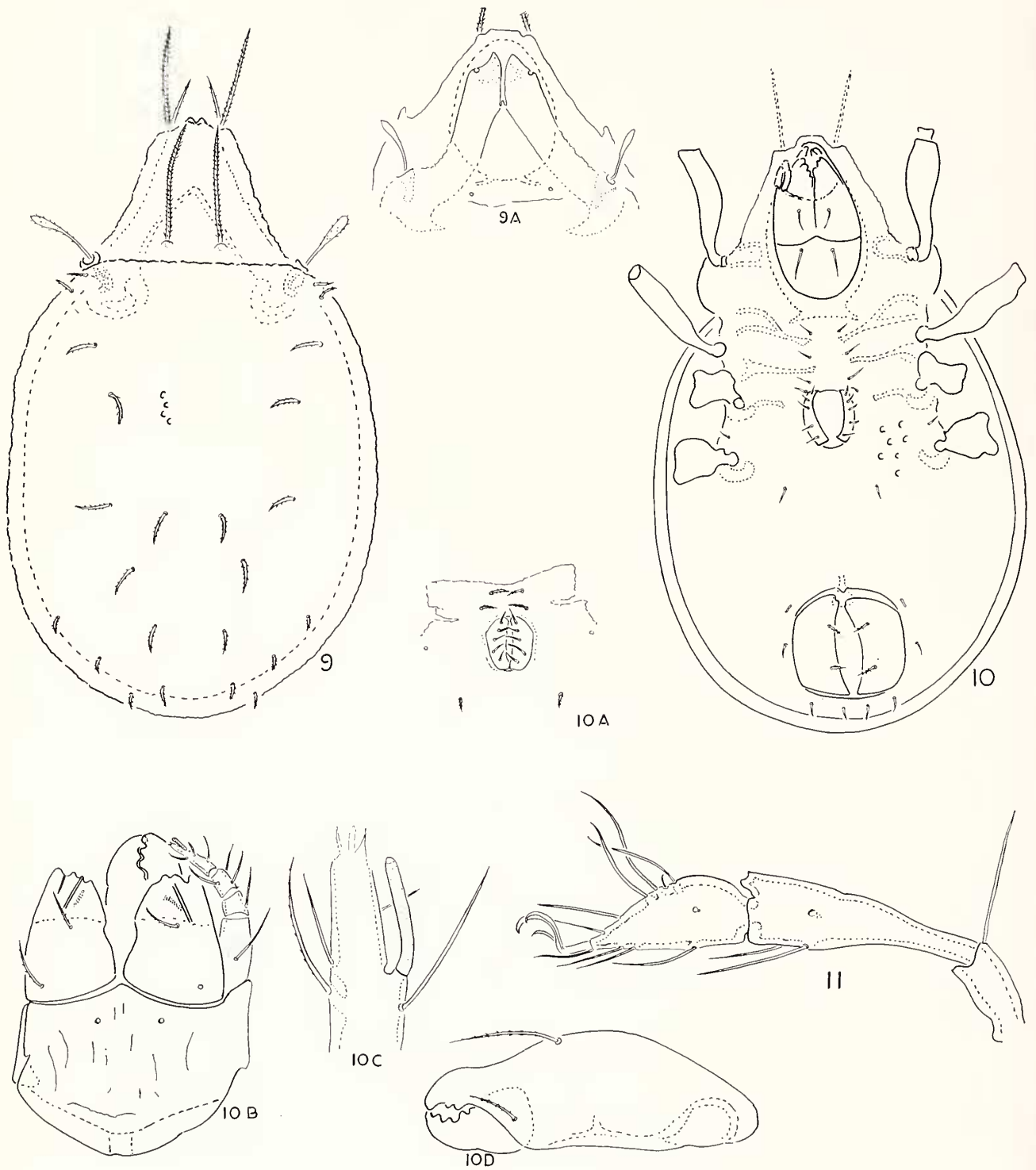


FIG. 9. *Xenillus anasillus*, n. sp., from the dorsal aspect, cerotegument in place on prodorsum; 9A, dissected specimen from The Cedars, cerotegument removed, prodorsum.

FIG. 10. *Xenillus anasillus*, n. sp., from the ventral aspect; 10A, dissected specimen from The Cedars, genital area; 10B, same, infracapitulum; 10C, same, palp tarsus; 10D, same, chelicera.

FIG. 11. Tibia and tarsus I of *X. anasillus*, n. sp., from the lateral aspect, some setae missing.

The type, a single specimen, was collected at Soapstone, Wasatch Co., Utah, 4 September 1955, by H. and M. Higgins.

?*Xenillus anasillus*, n. sp.

(Figs. 9, 10, 11)

The specimens of this species from Lebanon are newly emerged adults with a cerotegument or nymphal skin attached. The characters appear to be definitive, however, so the species is described below with a slight reservation concerning the maturity of the specimens.

DIAGNOSIS: Differs from other known species of *Xenillus* in the setose hairs on the prodorsum and notogaster. This is indicated in the specific name, **anasillos**, implying bristled hairs.

DESCRIPTION: Color yellow; prodorsum broadly triangular with a squarish, truncated rostrum; rostral hairs setose, about half as long as lamellar hairs, inserted on either side of truncated rostral tip in broad notches; lamellae wide, flat blades with wide, medially pointed cusps (Fig. 9); lamellar hairs setose, about as long as interlamellar hairs, inserted in lateral corners of lamellar cusps; a small mucro on translamella at base of lamellar cusps; pseudostigmata cornuate, at bases of lamellae; sensillus clavate, slightly setose (Figs. 9, 9A).

Hysterosoma with wrinkled margins, integument pitted; dorsosejugal suture nearly straight; twelve pairs of setose, slightly curved notogastral setae; two pairs of humeral setae at shoulders, others as in Fig. 9.

Camerostome, mentum, mental hairs, gena, genal hairs, rutella, chelicerae, and palps as seen in Figs. 10, 10B, 10C, 10D; palps with a bent, finger-like solenidion near tip of tarsus (Figs. 10B, 10C); rutella with roughened molar surface on dorsal face; ventral plate pitted, ventral setae and apodemata as in Fig. 10; apodemata III interrupted, medial and remote from genital opening; genital aperture closer to level of insertion of legs III than to IV, about two and one-half times its length anterior to anal opening; each genital cover with five setose setae (Figs. 10, 10A); aggenital setae setose, short, posterolaterad of genital opening; anal opening squarish, about three times larger than genital, each anal cover with two slightly barbed setae inserted nearer medial margin than lateral; fissure *iad* near anterolateral corner of opening; three pairs of adanal setae, *ada:3* lateral to anal opening between levels of *a:1* and *a:2*; *ada:2*, *ada:1* posterior to anal opening.

LEGS: Heterotridactylous; tibia and tarsus I as seen in Fig. 11.

LENGTH: Prodorsum 174 μ , hysterosoma 552 μ ; width: 456 μ .

The type is one of four specimens taken from Syni Latakia, Lebanon, 2 August 1953 by K. A. Christiansen; one specimen was collected at The Cedars, Lebanon, 2 May 1953, by K. A. Christiansen; two specimens were collected at Chamlane, Lebanon (277b) in 1953, and one nymph was collected at Ain Zahlte, Lebanon, 28 November 1953, by K. A. Christiansen.

DISCUSSION: One of the most striking features of this species is the barbed, setose hairs of the prodorsum and notogaster. This is characteristic of most of the ventral setae as well. Another apparently diagnostic feature is the finger-like solenidion of the palp tarsus, although a similar arrangement has been observed in other Liacaroidea.

Most of the traits of this species place it in the genus *Xenillus* without question, but one disjunct characteristic is the number of genital hairs. We have indicated this slight disparity, which may be due to the relative maturity of the specimens, by the question mark preceding the name.

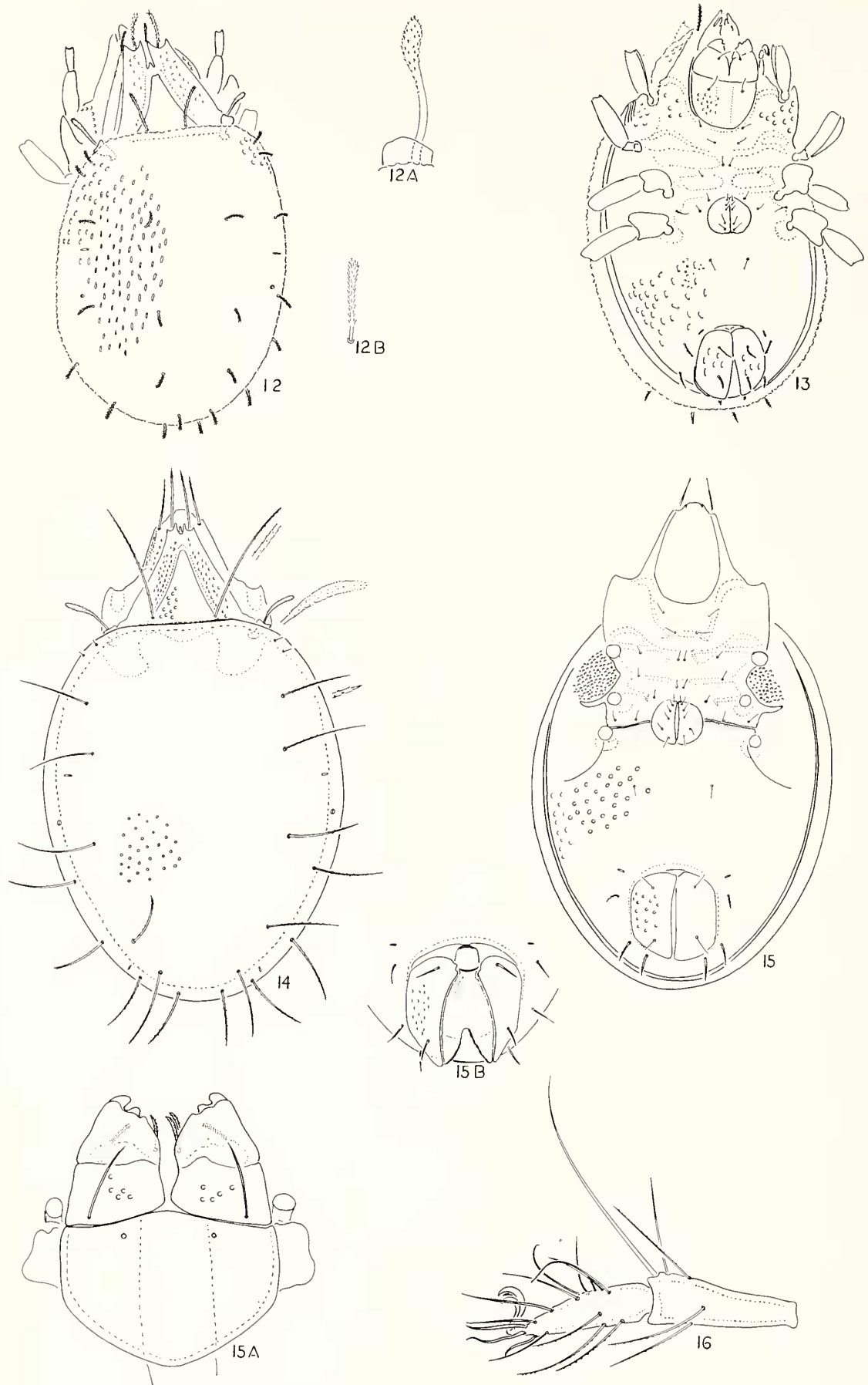


FIG. 12. *Xenillus phryxothrix*, n. sp., from the dorsal aspect; A, sensillus, enlarged free-hand sketch; B, notogastral hair, enlarged free-hand sketch.

FIG. 13. *Xenillus phryxothrix*, n. sp., from the ventral aspect.

FIG. 14. *Xenillus ionthadosus*, n. sp., from the dorsal aspect.

Xenillus phryxothrixus, n. sp.

(Figs. 12, 13)

DIAGNOSIS: The most distinctive feature of this new species is the bristling, barbed hairs of the prodorsum and notogaster, as implied in the trivial name. The lamellae are similar to *X. clypeator*, but have pointed, subequal dentes and a more prominent mucro. The elongated pits of notogaster are similar to *X. gelasinus*, n. sp., but again, the lamellae are much different. The new species differs from *X. anasillus*, n. sp. in the lamellar cusps and shorter length of prodorsal hairs, although in both species the hairs are barbed.

DESCRIPTION: Color yellow-brown; prodorsum broadly triangular, surface pitted; rostral hairs with fine bristles, shorter than lamellar hairs inserted in short prominences at distal ends of tutorium; lamellae broad, pitted, covering most of lateral and anterior surface of prodorsum, with cusps about as long as rostral hairs, each cusp with an excavated anterior margin forming two sharp, subequal dentes; lamellar hairs beset with fine bristles, about a fourth longer than rostral hairs, inserted in distal excavation of lamellar cusps; translamella consisting of a short bar and bluntly pointed mucro; interlamellar hairs with fine bristles, longer than rostral or lamellar hairs, inserted near dorsosejugal suture mediad of lamellae; pseudostigmata cornuate, protruding slightly from beneath anterior margin of hysterosoma; sensillus clavate, with fine spines on surface; pedotecta I robust, anterolaterad of pseudostigmata.

Hysterosoma broadly oval in outline, with somewhat roughened, straight dorsosejugal suture, surface with elongated pits, pits slightly longer than width of notogastral setal insertions; notogastral hairs somewhat robust, beset with fine bristles, claviform; fissure *im* and glandular opening as seen in Fig. 12.

Infracapitulum with pitted mentum; setae, ventral plate, apodemes as seen in Fig. 13; surface of venter with elongated pits similar to those of notogaster, pits extended in different directions, with fine stippling between pits; genital opening trapezoidal, each genital cover with five setae; g:4, g:5 closer to posterior margin; aggenital setae simple, closer to genital opening than to anal; anal opening more than twice as large as genital, each anal cover with elongated pits and two finely barbed anal setae; fissure *iad* at anterolateral corner of anal opening; adanal setae finely barbed, ada:3, ada:2 laterad of anal opening, ada:1 posterior.

LEGS: Heterotridactylous.

LENGTH: 528 μ , hysterosoma 372 μ ; width 312 μ .

The type was collected at Durham, N. C., 10 March 1963, by Louis J. Metz (RT-S-1, 231-D) and will be deposited in the U. S. National Museum. Six additional specimens were collected by Dr. Metz from the same locality, but on different dates, two specimens on 11 May 1963, three specimens on 8 November 1962, and one specimen on 14 November 1963. Another specimen of this species was collected from floor debris at Dismal Gardens, Franklin Co., Alabama, 4 September 1961 by J. Wagner and W. Suter.

DISCUSSION: Like *X. anasillus*, n. sp., from Lebanon, *X. phryxothrixus*, n. sp., has barbed, bristling hairs, but differs markedly in the cuspal features of the lamellae, the insertions of the lamellar hairs, and the pitted integument. In the

FIG. 15. *Xenillus ionthadosus*, n. sp., from the ventral aspect; A, ventral view of infracapitulum without palp; B, anal aperture of paratype showing preanal piece and anal membranes.

FIG. 16. Tibia and tarsus I of *X. ionthadosus*, n. sp., from the lateral aspect.

specimens available only five genital setae were observed on each genital cover, which is common to both of these species. Dissections of additional specimens may demonstrate more setae, especially if the specimens observed of *X. anasillus* prove to be subadult.

Xenillus ionthadosus, n. sp.

(Figs. 14, 15)

DIAGNOSIS: This new species differs from other species of the genus in the distinctively long, finely barbed notogastral setae as implied in the trivial name. The lamellae are similar to *X. gelasinus*, n. sp., but have longer medial dentes and a more pointed mucro; the interlamellar hairs of the new species are longer than the prodorsum, another distinguishing characteristic.

DESCRIPTION: Color reddish-brown; prodorsum pitted, broadly triangular in outline, with blunt, truncated rostrum; rostral hairs slightly shorter than lamellar hairs, finely barbed, inserted in angled prominences at anterolateral margins of prodorsum, behind rostrum; lamellae about as wide as width of rostral tip, pitted, with two dentes at ends of cusps, medial dens longer than lateral, a pointed mucro between cusps; lamellar hairs slightly longer than rostral hairs, finely barbed, inserted in distal ends of lamellae between cusps; translamella present; interlamellar hairs finely barbed, about three times as long as rostral hairs, curved outward, inserted near base of lamellae at margin of dorsosejugal suture; pseudostigmata partly extended beyond margin of hysterosoma; sensillus clavate, finely barbed; pedotecta I as in Fig. 14.

Notogaster oval in outline, with nearly straight, roughened dorsosejugal suture; eleven pairs of notogastral setae; two pairs of simple, short, humeral setae; remaining dorsal setae longer than lamellar pairs, finely barbed, slightly curved; surface of notogaster pitted; fissure *im* and glandular opening as in Fig. 14.

Camerostome oval; infracapitulum with rounded pits on ventral surface (Fig. 15A); each rutellum with a rutellar brush and spinose area on dorsal surface, two setose hairs on dorsomedial margin; surface of ventral plate pitted, pits rounded, larger than on notogaster; ventral setae, apodemes as in Fig. 15; trochanteral fossae of legs II, III with small tubercles; genital opening nearly round, surface of each genital cover finely stippled; six pairs of genital setae; a prominent transverse suture dividing ventral plate between genital opening and legs IV; aggenital setae simple, inserted slightly closer to genital opening than to anal; fissure *iad* remote from anterolateral corner of squarish anal opening; surface of each anal cover with rounded pits, smaller than pits of venter, anal setae simple; adanal setae finely barbed, *ada:3* behind level of *a:1* laterad of anal opening, *ada:2* posterolaterad of corner of opening, *ada:1* behind anal opening, closer to corner than to medial edge of cover.

LEGS: Heterotridactylous; tibia and tarsus I as in Fig. 16.

LENGTH: 936 μ , prodorsum 222 μ , hysterosoma 714 μ ; width: 564 μ .

The type and 48 specimens were taken from debris at log, Cloudland State Park, Trenton, Dade Co., Georgia, 3 September 1961, by J. Wagner and W. Suter. One specimen was collected at Soapstone, Wasatch Co., Utah, 4 September 1955, by H. and M. Higgins. One specimen was obtained at Whitesides Cove, Highlands, North Carolina, 28 July 1957 by S. and D. Mulaik. Three specimens were collected from leaf litter at E. Baton Rouge Parish, Louisiana, 6 October 1962, by C. L. Rockett. The type and some paratypes will be deposited in the U. S. National Museum.

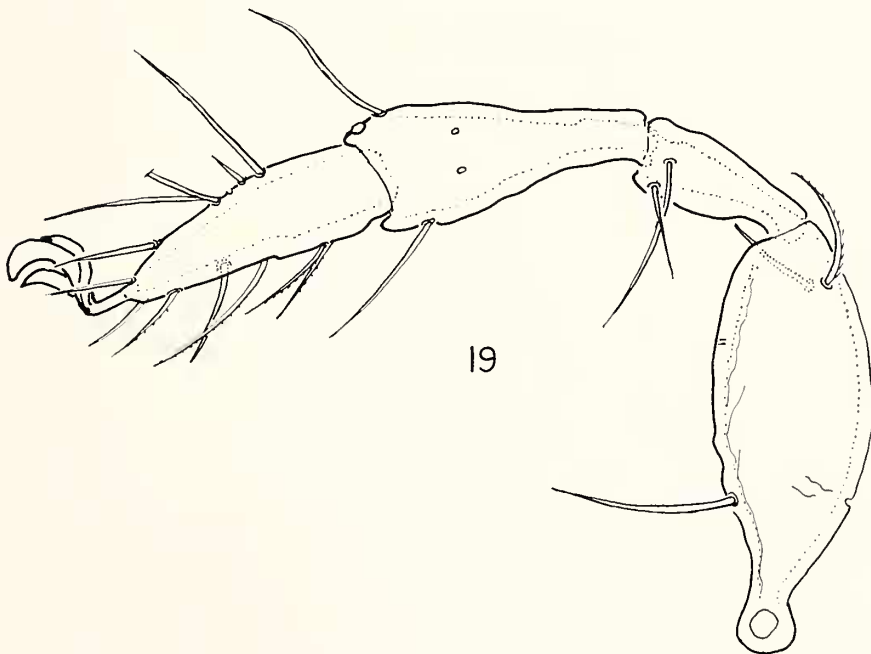
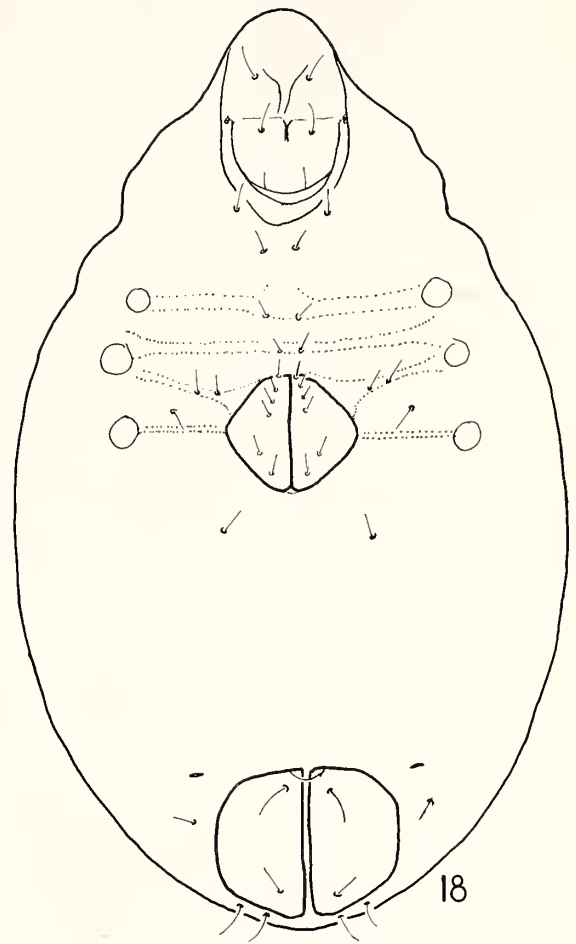
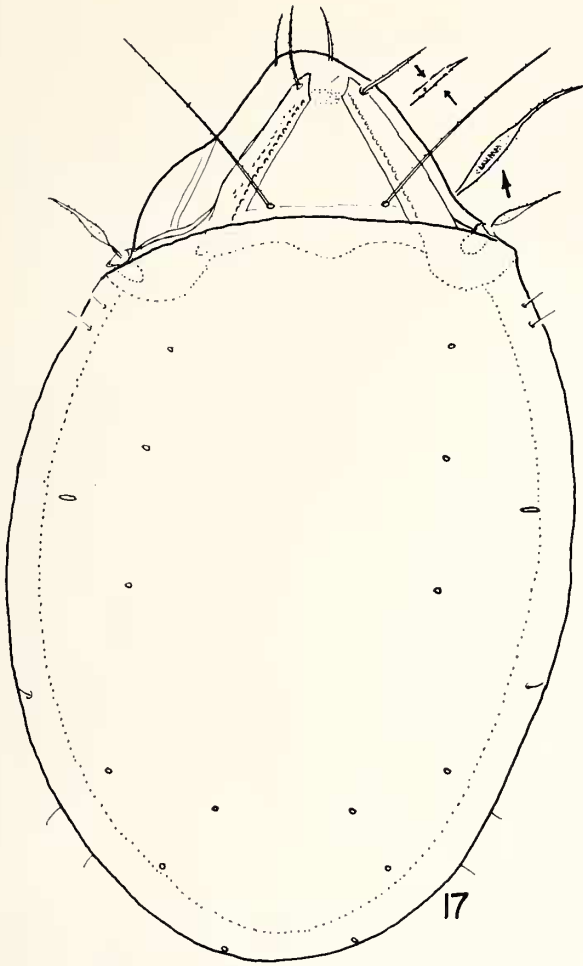


FIG. 17. *Stenoxenillus atraktus*, n. gen., n. sp., from the dorsal aspect.

FIG. 18. *Stenoxenillus atraktus*, n. gen., n. sp., from the ventral aspect.

FIG. 19. Leg I of *Stenoxenillus atraktus*, n. gen., n. sp., from the lateral aspect, some setae missing.

DISCUSSION: The long notogastral hairs comprise the most distinctive feature of this species and differentiate it from all other species in the genus. The transverse suture extending from the genital opening and dividing the ventral plate may also be distinctive, but similar sclerotization occurs in at least one other example of the family, *Stonyxenillus akidosus*, n. gen., n. sp. Further comparisons of this feature will have to be made.

New Genera and Species

The following new genera and species are characterized by a spindleform sensillus that is barbed or smooth, and are differentiated principally by this type of organ from *Xenillus* with its claviform sensillus. One species in the literature, *Xenillus alpestris* Willmann, 1929, also has a spindleform sensillus, but the lamellae are extremely narrow, and only one humeral bristle is present. We conclude that *X. alpestris* is not a *Xenillus*, nor does it fit within any of the new genera, although it appears to be in the Liacaroidae. Since its placement is uncertain, we have omitted it temporarily from consideration within this complex.

Stenoxenillus atraktus, n. gen., n. sp.

(Figs. 17, 18, 19)

DIAGNOSIS: Lamellae narrow and straight with a small lateral dens at distal end, medial margin rough, with small cornicles along medial edge; sensillus elliptical and spindle-shaped; surface of notogaster with elongate pits. The generic name applies to the narrow and straight lamellae without a translamella, contrasting with *Xenillus*; the trivial name implies a spindle-like sensillus.

DESCRIPTION: Color dark brown; rostrum triangular, rounded anteriorly; rostral hairs missing in type specimen (in another specimen these hairs are finely barbed, shorter than lamellar hairs); surface of prodorsum finely pitted; lamellae long, narrow blades, a lateral dens at end of cusp, medial margin of lamellae roughened with small cornicles, other surface finely pitted; lamellar hairs about half as long as lamellae, extended upward, finely barbed, inserted posterior to cusp; interlamellar hairs absent in type (in another specimen more than twice as long as lamellar hairs, finely barbed), insertions anterior to dorsosejugal suture; pseudostigmata at posterolateral corners of prodorsum; sensillus spindle-shaped, a narrow pedicel, swollen mid-part and spine-like distal tip, finely barbed.

Surface of notogaster with very tiny pits; twelve pairs of simple notogastral setae (Fig. 17); fissure *im* lateral.

Camerostome oval; infracapitulum, ventral setae, and apodemata as seen in Fig. 18; genital aperture trapezoidal, about twice its length anterior to anal opening; each genital cover with six setae, g:1, g:2, g:3, g:4 in a slightly diagonal line, closer together than g:5, g:6; g:5 more laterally placed than any of the genital setae; aggenital setae about twice their length from genital aperture; anal opening nearly twice as large as genital opening, nearly square, adjacent to posterior margin of ventral plate; each anal cover with two simple setae; fissure *iad* at anterolateral corner of anal opening, remote from margin of opening by about twice its length; three pairs of anal setae, ada:3 at level of middle of cover, ada:2, ada:1 posterior to anal opening; other features of venter as seen in Fig. 18.

LEGS: Heterotridactylous; part of leg I as seen in Fig. 19.

LENGTH: 1,050 μ ; width: 636 μ .

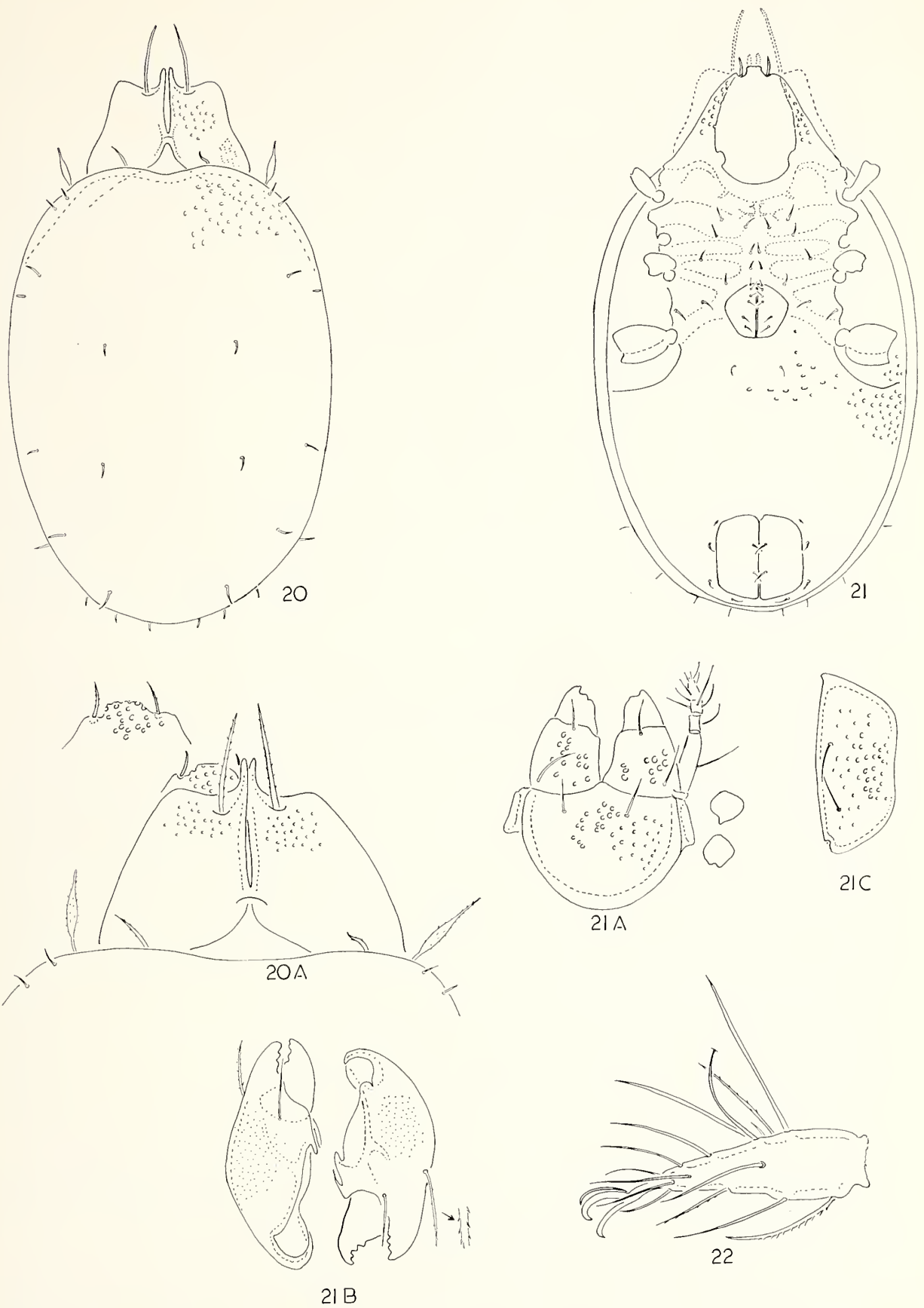


FIG. 20. *Stonyxenillus spilotus*, n. gen., n. sp., from the dorsal aspect; A, enlarged sketch of prodorsum, lamellae, and rostrum.

FIG. 21. *Stonyxenillus spilotus*, n. gen., n. sp., from the ventral aspect; A, infracapitulum from ventral view; B, chelicerae; C, anal plate from ventral view.

FIG. 22. Tarsus I of *Stonyxenillus spilotus*, n. gen., n. sp., from the lateral aspect.

A single specimen of this species was collected at Duke Forest, Durham, N. C., August 1952 by S. Mulaik. This type specimen will be deposited in the U. S. National Museum. Another specimen was taken from a floor debris pocket, Dismal Gardens, Franklin Co., Alabama, 4 September 1961 by W. Suter and J. Wagner.

DISCUSSION: This new species, **Stenoxenillus atraktus**, differs from other species and some genera in the family by the narrow, straight lamellae and the absence of a translamella or a mucro. It is further differentiated by the corniculated medial margin and finely pitted surface of the lamellae. Since the type and only one other specimen were found, it is not possible to discuss variations of form, but we consider this species is distinct from any others of the family that we have observed so far.

Stonyxenillus, n. gen.

DIAGNOSIS: The genus is characterized by a barbed, spindleform sensillus and broad lamellae that may cover the prodorsum and have one or two dentes. The name is from the Greek, *stonyx*, indicating a sharp point for both the sensillus and the cuspal dentes of the lamellae, but the name is tied to *Xenillus* to indicate familial and generic relationships.

Stonyxenillus spilotus, n. sp.

(Figs. 20–22)

DIAGNOSIS: Differs from other species in the genus by the broad lamellae covering nearly all of the prodorsum, the long, pointed medial lamellar dentes, and the long lamellar hairs.

DESCRIPTION: Color dark brown; rostrum truncated anteriorly, with lateral notches for insertions of rostral hairs, pitted surface (Figs. 20, 20A); rostral hairs about as long as dens of lamella, slightly barbed, decurved, inserted in notches posterior to truncated rostral tip; lamellae broader than prodorsum, pitted dorsally, with prominent anterior medial dens, deeply cleft to level of short translamella; lamellar hairs nearly straight, as long as width of lamella at level of translamella, with small barbs, inserted posterior to anterior margin of lamella in a broad cleft, closer to medial margin than to lateral (Figs. 20, 20A); translamella short, heavily sclerotized, located at base of cleft between lamellae, closer to dorsosejugal suture than to anterior tips of lamellae; interlamellar hairs about same length as rostral hairs, decurved, inserted beneath anterior margin of hysterosoma, approximately in middle of width of lamella; pseudostigmata under anterolateral margins of hysterosoma; sensillus spindleform, with tiny barbs on surface (Figs. 20, 20A).

Notogaster oval in outline except for slightly invaginated anterior margin, surface pitted; twelve pairs of notogastral setae, the two pairs of simple humeral bristles in clear margin adjacent to pseudostigmata and sensillus (Figs. 18, 20).

Camerostome truncate posteriorly, heavily pitted laterad of opening; infracapitulum, chelicerae, mentum, rutella as seen in Figs. 21A, B; ventral surface of mentum pitted, with two squarish, articulating condyles; ventral setae, apodemata as seen in Fig. 21; genital opening between levels of legs III and IV, trapezoidal in outline; each genital cover with six simple, short setae, g:1, g:2, g:3, g:4 close together in straight line near medial margin of cover, g:5, g:6 nearer posterolateral margin of cover; aggenital setae about three times their lengths posterior to genital opening; anal aperture nearly square, in posterior end of

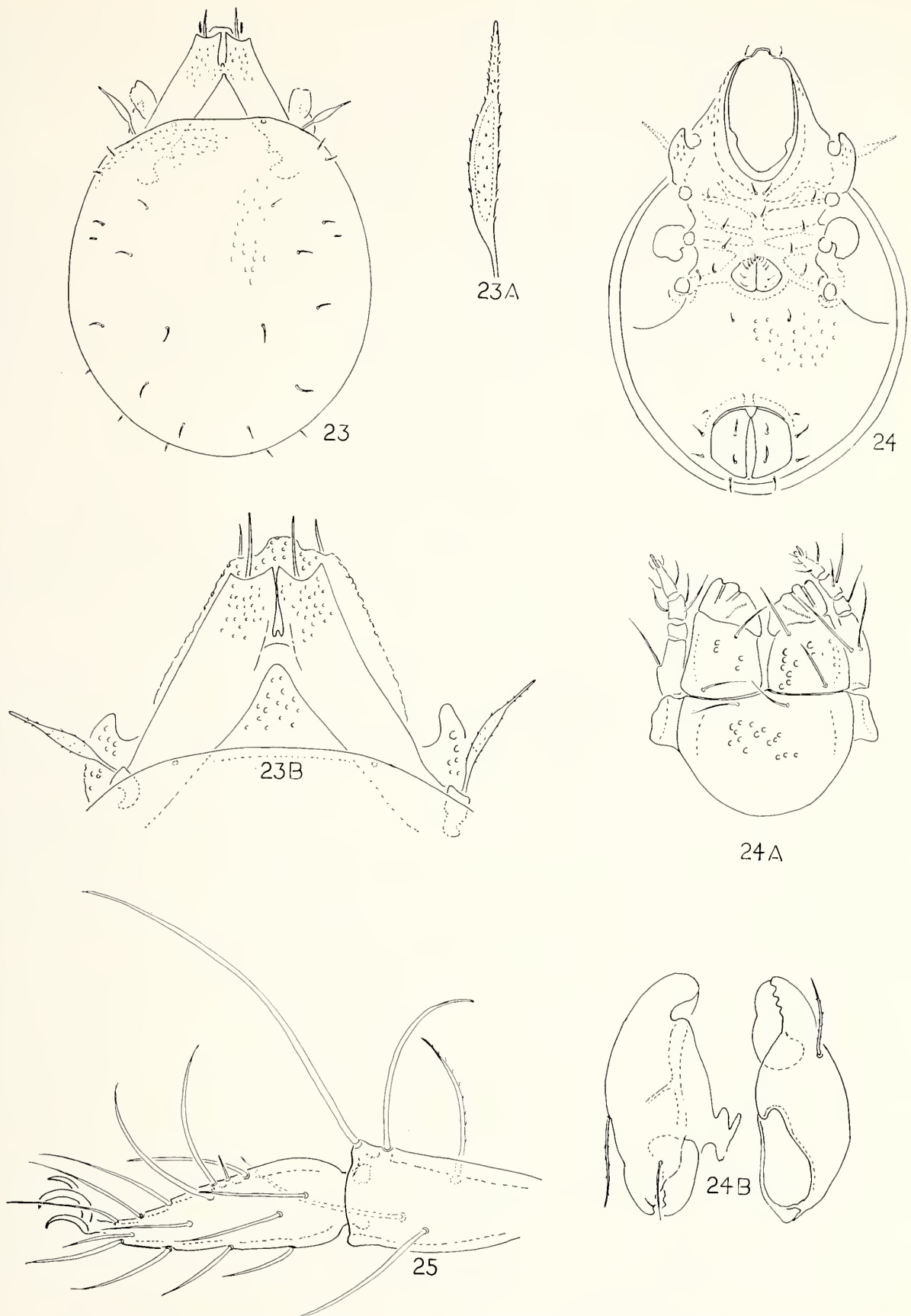


FIG. 23. *Stonyxenillus anakolosus*, n. gen., n. sp., from the dorsal aspect; A, enlarged free-hand sketch of sensillus; B, enlarged sketch of prodorsum and lamellae.

FIG. 24. *Stonyxenillus anakolosus*, n. gen., n. sp., from the ventral aspect; A, infracapitulum; B, chelicerae.

FIG. 25. Tibia and tarsus I of *Stonyxenillus anakolosus*, n. gen., n. sp., from the lateral aspect.

ventral plate; each cover with two simple setae near medial margin of cover and nearer center of length of cover than ends (Figs. 21, 21C); fissure *iad* near anterolateral corner of anal opening; adanal setae as seen in Fig. 21, *ada:1* posterior to cover, *ada:2* at posterolateral corner of opening, *ada:3* lateral to anal opening at level of *a:1*.

LEGS: Heterotridactylous (Fig. 22).

LENGTH: Hysterosoma 454 μ ; prodorsum 138 μ ; width: 318 μ .

The specific name from the Greek, **spilotos**, implies a spotted appearance based on the pitted integument of the lamellae and notogaster.

Four specimens of this species were collected seven miles from Highlands Biological Station, Whiteside Cove, Jackson Co., North Carolina, elevation 3,300', 5 July 1961, by S. and D. Mulaik. The type will be deposited in the U. S. National Museum.

Stonyxenillus anakolosus, n. sp.

(Figs. 23–25)

DIAGNOSIS: The broad lamellae of this species are similar to those of *S. spilotus*, n. sp., but have two short, subequal dentes and a small mucro on the translamella; the lamellar hairs are inserted in the tips of the lamellae between the dentes; the new species is also smaller and more rotund than *S. spilotus*, n. sp.

DESCRIPTION: With characters of the genus; color dark brown; prodorsum nearly covered by lamellae, rostrum truncate anteriorly, with pitted surface, lateral notches for insertions of rostral hairs; rostral hairs simple, about as long as width of lamellar cusp, inserted in flat notches lateral to anterior tip of rostrum; lamellae of about equal width throughout length, with pitted surface and prominent, wide cusps, cusps slightly excavated anteriorly producing two short dentes, a deep cleft between cusps; lamellar hairs fairly straight, slightly longer than rostral hairs, inserted in anterior margins of lamellar cusps; translamellar present, with a short, blunt mucro in cleft between lamellar cusps; insertions of interlamellar hairs beneath margin of dorsosejugal suture; surface of prodorsum with larger pits than on lamellae; pseudostigmata under humeral margins of hysterosoma; sensillus spindleform, with fine barbs on surface (Fig. 23A).

Hysterosoma nearly round in outline, with slightly excavated anterior margin, surface pitted with small pits (Fig. 23); twelve pairs of slightly barbed notogastral setae, two pairs humeral in position (in the type specimen three humeral setae are present on the left side, two on the right); fissure *im* inserted near lateral margin nearly midway the length of the dorsum.

Camerostome elongated and oval, with sclerotized, pitted margins; infracapitulum, chelicerae, mentum, rutella as seen in Figs. 24A, B; rutella with diagonal roughened surface, the *rutellar brush*, posterior to distal toothed margin on dorsal surface; ventral setae, apodemata as seen in Fig. 24; genital aperture a third as large as anal, located between levels of legs III, IV, trapezoidal in outline, with a perigenital ring formed of the confluence of apodemata III, IV; each genital cover with six setae, *g:1*, *g:2*, *g:3*, *g:4* inserted close together in a diagonal line, *g:5*, *g:6* in middle of width of cover nearer posterior margin (Fig. 24); aggenital setae simple, about three times their lengths posterior to genital opening; anal opening nearly square; each anal cover with two setae inserted nearer medial margin of cover than lateral; fissure *iad* near anterolateral corner of anal opening; adanal seta *ada:1* posterior to anal aperture, *ada:2*, *ada:3* laterad of anal opening, nearly at levels of *a:2* and *a:1* respectively.

LEGS: Heterotridactylous; tibia and tarsus I as seen in Fig. 25.

LENGTH: Prodorsum 126 μ , hysterosoma 354 μ ; width: 294 μ .

A single specimen of this species, the type, was collected four miles north of Cherokee, N. C., 28 May 1957, by W. Mason; one specimen from Newfound Gap, Great Smoky National Park, N. C., 10 July 1957, by S. and D. Mulaik; one specimen from Murphy, N. C., 19 July 1957, by S. and D. Mulaik; eight specimens from between boulders, Smoky Mountain Nat. Park, Sevier Co., Tenn., 25 July 1956, by H. Dybas (CNHM 56-28); one specimen from debris, Dismal Gardens, Franklin Co., Alabama, 4 September 1961, by J. Wagner and W. Suter. The specimens from Tennessee were found in company with *Liacarus spiniger* Jacot, 1937, and a new species of *Liacarus* to be described. The type specimen will be deposited in the U. S. National Museum.

DISCUSSION: This species is of smaller size than others previously described. It differs from *S. spilotos*, n. sp., in the two sharp dentes at the ends of the lamellar cusps, in the variations of the sizes of pits on the lamellae, prodorsum, and notogaster, and in the minute details of the barbed sensillus.

The trivial name is taken from the Greek, **anakolosos**, which implies docked or shortened, and has particular reference to the smaller, stocky form that typifies this mite.

Stonyxenillus akidosus, n. sp.

(Figs. 26, 27)

DIAGNOSIS: This new species differs from *S. spilotus* and *S. anakolosus*, n. spp., in the narrower lamellae and the barbed notogastral hairs, the latter indicated in the trivial name. The generic character of the barbed, spindleform sensillus is characteristic of all three species. The humeral bristles of *S. akidosus*, n. sp., are longer, more robust, and finely barbed rather than simple and short as in other species in the family.

DESCRIPTION: Color yellowish-brown; rostrum truncated, slightly notched; rostral hairs straight, finely barbed, about same length as lamellar hairs, inserted in distal tips of tatorium; lamellae flattened, a fourth as wide as prodorsum, with pitted surface, cusps short, with two subequal dentes; lamellar hairs straight, about same length as rostral hairs, finely barbed, inserted in distal tips of lamellar cusps between dentes; translamella short, with a pointed mucro about same length as medial cuspal dens; interlamellar hairs slightly longer than lamellar hairs, finely barbed, inserted near dorsosejugal suture at medial edge of lamellae; pseudostigmata posterior to pedotecta I; sensillus spindleform, finely barbed (Fig. 26); pedotecta I about a third as long as prodorsum, rectangular.

Surface of hysterosoma with fine pits (Fig. 26); dorsosejugal suture nearly straight, hysterosoma nearly round in outline; eleven pairs of finely barbed notogastral setae; humeral bristles more robust than in other species, barbed; fissure *im*, other details of dorsum as in Fig. 26.

Infracapitulum, chelicerae, ventral plate, ventral setae, and apodemata as seen in Fig. 27; trochanteral fossae II, III with small tubercles; genital opening trapezoidal, each cover with six genital setae, g:1 in anterior margin of cover near medial corner, g:2-5 inserted in diagonal line posterolaterally, g:6 near medioposterior corner of cover; aggenital setae inserted nearly equidistant between genital and anal openings, but slightly closer to genital; squarish anal aperture about twice as large as genital, each anal cover with two setae; fissure *iad* posterolaterad of anal opening, at level of a:1; adanal setae finely barbed, ada:3 inserted laterad of anal opening at level of middle of cover, ada:2 near posterolateral corner of cover; ada:1 posterior to each anal cover.

LEGS: Heterotridactylous, femora II, III, IV keeled.

LENGTH: 618 μ , prodorsum 132 μ , hysterosoma 486 μ ; width: 396 μ .

The type and five paratypes were collected from mixed forest floor northeast of Fentress, Norfolk Co., Virginia, 5 June 1965, by W. Suter. The type will be deposited in the U. S. National Museum.

DISCUSSION: Compared to other species of *Stonyxenillus*, *S. akidosus*, n. sp., has the longest notogastral hairs of any, and the humeral bristles are the longest of any in the family. Conversely, the lamellae in this species are narrower and less extensive than in the other species of the genus.

Leuroxenillus trichionus, n. gen., n. sp.

(Figs. 28, 29, 30)

DIAGNOSIS: The distinctive generic features of this mite are the smooth, spindleform, narrowly lanceolate sensillus, which contrasts to other currently known genera, and the smooth rostral, lamellar, and interlamellar hairs. The species is distinguished by these features as well as the elongated lamellar cusps with a prominent mucro. No other genera or species currently have these characteristics in this combination. The generic name refers to the smooth sensillus, the trivial name to the relatively short notogastral hairs.

DESCRIPTION: Color yellowish-brown; surface of prodorsum with fine pits; rostrum slightly notched, rostral hairs smooth, straight, shorter than lamellar hairs, inserted in distal tips of tectorium; lamellae narrowed, tuberculous, with elongated cusps about a third the length of prodorsum, cusps with small, subequal dentes; lamellar hairs longer than rostral hairs, straight, smooth, inserted in distal tips of lamellar cusps; lamellae joined medially in a broad translamella with a narrowed median mucro about half as long as length of lamellar cusps; interlamellar hairs setiform, smooth, curved, slightly longer than lamellar hairs, inserted near medial edges of lamellae close to dorsosejugal suture; pseudostigmata projected slightly beyond margin of hysterosoma, cornuate beneath surface; sensillus spindleform, narrowly lanceolate, smooth, slightly longer than lamellar hairs; pedotecta I as seen in Fig. 28.

Hysterosoma ovoid, dorsosejugal suture slightly arched anteriorly; eleven pairs of notogastral setae visible; two pairs of humeral setae shorter than other dorsal hairs, remaining pairs simple, curved, about as long as rostral hairs (Fig. 27).

Infracapitulum, ventral plate, ventral setae, and apodemes as seen in Fig. 29; trochanteral fossae II, III with small tubercles; genital opening rounded, between legs III, IV, each genital cover with six setae, g:1 inserted in anterior edge of cover near medial corner, g:2-4 inserted in diagonal line posterolaterad, g:5 inserted laterally on cover, g:6 inserted more medially; aggenital setae inserted closer to genital opening than to anal; fissure *iad* near anterolateral corner of anal opening; anal aperture about three times larger than genital aperture, each anal cover with pair of long setae; three pairs of simple adanal setae, *ada*:3, *ada*:2 laterad of opening, *ada*:1 posterior to opening.

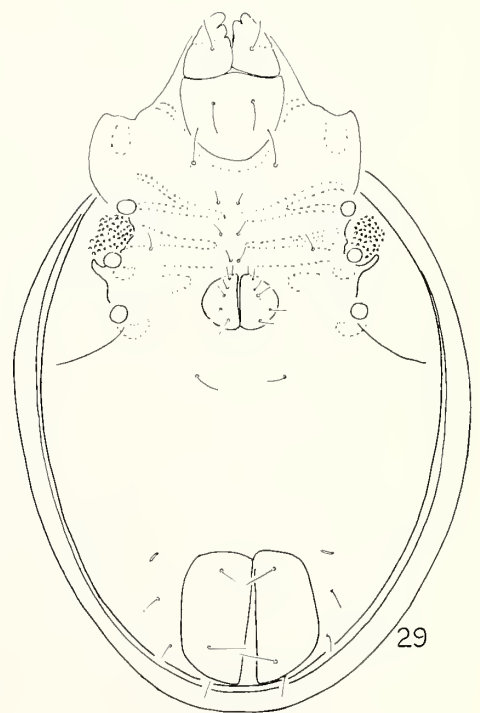
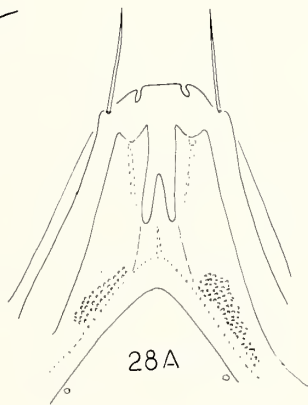
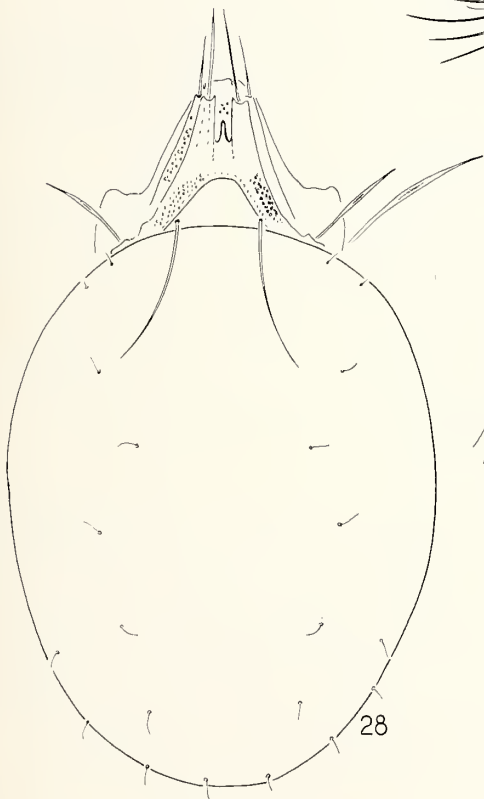
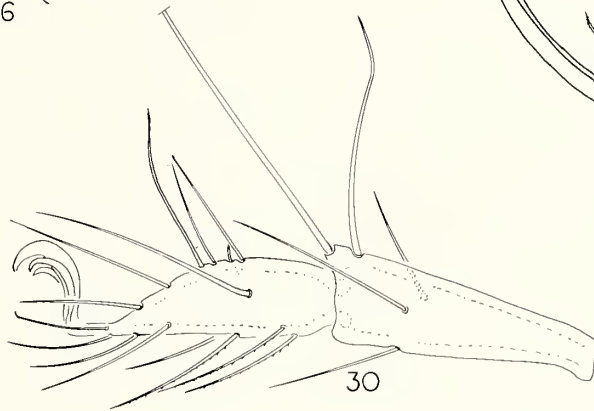
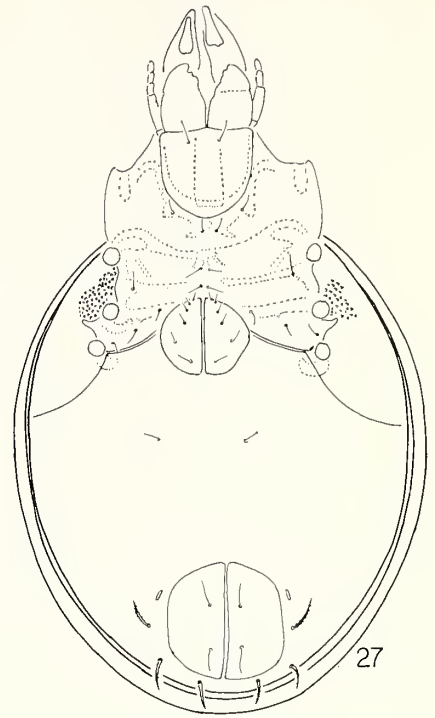
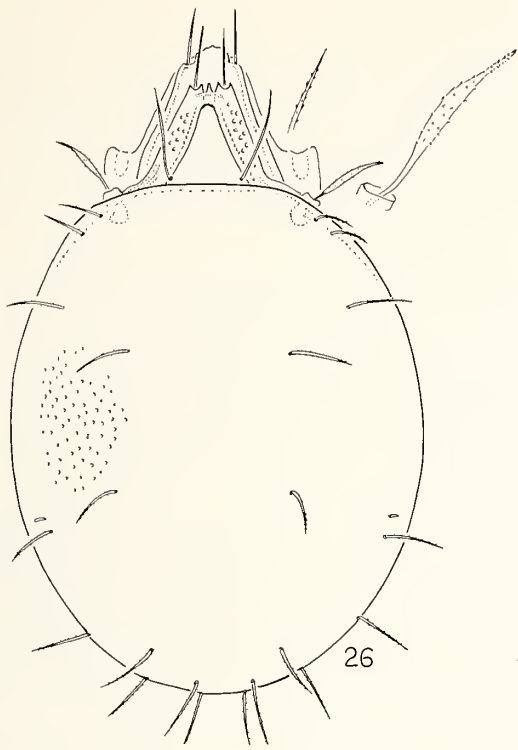
FIG. 26. *Stonyxenillus akidosus*, n. gen., n. sp., from the dorsal aspect. →

FIG. 27. *Stonyxenillus akidosus*, n. gen., n. sp., from the ventral aspect.

FIG. 28. *Leuroxenillus trichionus*, n. gen., n. sp., from the dorsal aspect; A, enlarged sketch of prodorsum, rostrum, and lamellae.

FIG. 29. *Leuroxenillus trichionus*, n. gen., n. sp., from the ventral aspect.

FIG. 30. Tibia and tarsus I of *Leuroxenillus trichionus*, n. gen., n. sp., from the lateral aspect.



LEGS: Heterotridactylous; tibia and tarsus I as seen in Fig. 30.

LENGTH: 1,060 μ , prodorsum 240 μ , hysterosoma 820 μ ; width: 708 μ .

The type and four paratypes were collected from moss, four miles south of Waldport, Lincoln Co., Oregon, 2 February 1960, by G. W. Krantz and Mr. Lattin. The type will be deposited in the U. S. National Museum.

The drawing of the dorsum of this new species is a composite of several of the specimens.

DISCUSSION: The new family, **Xenillidae**, has a number of distinctive characteristics that have been mentioned previously. Other characteristics common to many liacaroids and not exclusive to genera and species of this new family are also important to note. The rutellar brush and spinose area posterior to it (Fig. 15A) on the dorsal surface of the rutellum are found in most of the Xenillidae examined, as well as in a number of species of liacarids that are under study. These rutellar features may be more extensively exhibited in other families also, as the Galumnidae have at least the rutellar brush. We infer that the brush and spinose area are common to the Liacaroidea. We also infer that many of the Liacaroidea exhibit tubercles on the ventral surface of the trochanteral fossae of legs II, III anterior to pedotecta II and behind pedotecta I. These tubercles are prominent in xenillids, but have also been found in some Liacaridae, though they may be less conspicuous. Research in progress should help to elucidate these characteristics at the familial and superfamilial levels.

Xenillidae, new family

Liacaroid mites with pitted or rugose integument and lamellae, claviform or spindleform sensilli, two humeral notogastral bristles, five or six pairs of genital setae, tuberculous trochanteral fossae II, III.

Key to the Genera and Species of **Xenillidae**

- | | | |
|---|---|---|
| 1. Sensillus clavate, barbed | Genus <i>Xenillus</i> | 6 |
| Sensillus spindleform, barbed or smooth | | 2 |
| 2. Spindleform sensillus narrowly lanceolate, smooth; rostral, lamellar, interlamellar hairs smooth; lamellar cusps narrower than lamellae; mucro half as long as lamellar cusp | Leuroxenillus trichionus , n. gen., n. sp. (Fig. 28) | |
| Spindleform sensillus swollen, barbed; rostral, lamellar, interlamellar hairs usually barbed; lamellar cusps usually as broad as lamellae | | 3 |
| 3. Lamellae narrow, without translamella or mucro | Stenoxenillus atraktus , n. gen., n. sp. (Fig. 17) | |
| Lamellae relatively broad, with translamella | Stonyxenillus , n. gen. | 4 |
| 4. Lamellae with single, long, medial dens at end of cusp; without a mucro | S. spilotus , n. sp. (Fig. 14) | |
| Lamellae with two subequal dentes at ends of cusps; with a mucro | | 5 |
| 5. Lamellar hairs about as long as width of cusp, mucro much shorter than length of cusps | S. anakolosus , n. sp. (Fig. 23) | |
| Lamellar hairs three times longer than width of lamellar cusp, mucro subequal in length to lamellar cusps and dentes | S. akidosus , n. sp. (Fig. 26) | |
| 6. Translamella absent | | 7 |
| Translamella present | | 8 |

7. Sensillus pyriform; lamellae without cuspal dentes; lamellar hairs inserted laterally
 ----- *X. latus* (Fig. 2)
 Sensillus elongate-claviform; lamellae with sharp median cuspal dens; lamellar hairs
 inserted in distal end of cusp ----- *X. tegeocranus* (Fig. 3)
8. Translamella without a mucro ----- 9
 Translamella with a mucro ----- 10
9. Lamellar hairs inserted in distal tips of conical cusps; interlamellar hairs barbed,
 about as long as lamellae ----- *X. splendens* (Fig. 4)
 Lamellar hairs inserted posterolaterad of median dens; interlamellar hairs shorter
 than lamellae ----- *X. sculptrus* (Fig. 5)
10. Lamellae with one median cuspal dens ----- 11
 Lamellae with two subequal cuspal dentes ----- 12
11. Lamellar hairs inserted in center of distal tip of lamellar cusp ----- *X. clypeator* (Fig. 1)
 Lamellar hairs inserted laterally in lamellar cusp behind distal tip -----
 ----- *X. anasillus*, n. sp. (Fig. 9)
12. Mucro, cuspal dentes subequal in length; notogastral hairs simple -----
 ----- *X. gelasinus*, n. sp. (Fig. 6)
 Mucro much shorter than cusps; notogastral hairs erect, bristling, barbed -----
 ----- *X. phyrxothrixus*, n. sp. (Fig. 12)

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